



US 20210123600A1

(19) **United States**(12) **Patent Application Publication**
NEMITALLAH et al.(10) **Pub. No.: US 2021/0123600 A1**(43) **Pub. Date: Apr. 29, 2021**(54) **INTEGRATED ITM MICROMIXER BURNER
OF SHELL AND TUBE DESIGN FOR CLEAN
COMBUSTION IN GAS TURBINES****F02M 26/19** (2006.01)**F02C 7/08** (2006.01)(52) **U.S. Cl.****CPC** **F23R 3/045** (2013.01); **F23R 3/286**
(2013.01); **B01F 5/0465** (2013.01); **F02C 7/08**
(2013.01); **F02M 26/19** (2016.02)(71) Applicant: **KING FAHD UNIVERSITY OF
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Dhahran (SA)(21) Appl. No.: **16/665,589**(22) Filed: **Oct. 28, 2019****Publication Classification**(51) **Int. Cl.****F23R 3/04** (2006.01)**F23R 3/28** (2006.01)(57) **ABSTRACT**

An integrated ITM micromixer burner shell and tube design for clean combustion in gas turbines includes an oxy-fuel micromixer burner for separating oxygen from air within the burner to perform oxy-combustion, resulting in an exhaust stream that consists of CO_2 and H_2O . The shell and tube combustion chamber is designed so that preheated air enters a headend having an array of ion transfer membrane (ITM) tubes that separate oxygen from the preheated air and anchor flamelets on the shell side. The combustion products of the oxy-fuel flamelets expand through a turbine for power generation, before H_2O is separated from CO_2 by condensation. A portion of the effluent CO_2 is compressed back into the burner system, while the remainder is captured for sequestration/utilization.

